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ABSTRACT

4MAT is an 8-step, sequential instructional model based on two theoretical constructs: Kolb's model of learning styles and the concept of brain hemisphericity. The model, developed by B. McCarthy (1987), is derived by interacting each of Kolb's four quadrants with both left and right brain. Kolb outlined four learning styles based on the four outcomes of interacting mode of perceiving with mode of processing information. McCarthy concluded that the full cycle of a lesson would include eight activities, accommodating each of the four types of learning using both left and right dominance in each quadrant. Such lessons highlight the style of each learner for some fraction of the whole, and rotation between left and right-brain activities also gives prime time to the basically different orientations and should lead to whole-brain performance. A review of professional literature on research with 4MAT, 4MAT as a tool for instructional design, 4MAT as a tool for staff development, and the 4MAT model as theory illustrate use and implications of the 4MAT model and assess its validity and legitimation. There is no direct criticism of the 4MAT model in the literature, though some educators have questioned the relevance of the concept of learning styles to instructional design. Legitimation of the model has come through academic discussion and widespread use of 4MAT concepts. Review of the literature on 4MAT has revealed little research on student achievement. The professional literature indicates that the 4MAT model is capable of comprehensive use, for developing instructional units for discursive as well as non-discursive disciplines, for secondary as well as elementary education, and for urban as well as suburban schools. (Contains 22 references.) (ND)

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A Serious Look at the 4MAT Model

INTRODUCTION

In 1964 Alice Miel presented her famous "spiral" which graphically demonstrated that American education changes major emphasis in each decade. The spiral accurately forecast that the "needs of society" would be the curriculum focus of the 1980's. This was reflected in the "back to basics" movement. The spiral also forecast that the 1990's would see a return to a curricular emphasis on the "needs of the individual."

The goals and philosophy of the 1980's were compatible with "no-nonsense" instructional models of the direct, explicit, "active" type. Examples were Explicit Teaching Method, Mastery Learning, and the Hunter Model. While these models remain fruitful and widely applicable, the spiral suggests that the 1990's will be characterized by a renewed interest in more holistic models that give attention to integrated curricula, learning styles, and more individualized forms of assessment. Older "integrated methods," such as project and problem-solving methods, should receive new interest. 4MAT, the newest of the integrated methods, should receive progressively more attention as the 1990's unfold.

What is 4MAT? What does the professional literature have to say about 4MAT? Does it have legitimacy? Is it useful? Is it intellectually sound? This paper will speak to such questions. If 4MAT is indeed to become a significant phenomenon in the 1990's, then such questions are worth an examination.

Description of 4MAT and Its Theoretical Basis

In broadest outline 4MAT is an eight-step, sequential model based on two theoretical constructs: Kolb's model of learning styles and the concept of brain hemisphericity. The eight-step model is derived by interacting each of Kolb's four "quadrants" with both left brain and right brain [McCarthy, 1987]. A description of this theoretical basis and of McCarthy's invention follows.

Kolb postulates four quadrants or learning styles based on the four outcomes of interacting mode of perceiving with mode of processing information, as described below:

1. Quadrant One learners perceive information concretely and process it reflectively. These are Imaginative Learners who integrate experience with self, who seek meaning, who learn best by listening and sharing.
2. Quadrant Two learners perceive information abstractly and process it reflectively. These are Analytic Learners who value sequential learning, who seek continuity, who want to know what the accepted knowledge is, who learn best in traditional ways.
3. Quadrant Three learners perceive abstractly and process actively. These are Common Sense Learners who must integrate theory and practice, who test ideas with common sense and experimentation, who want to know what works and why.
4. Quadrant Four learners perceive concretely and process actively. These are Dynamic Learners who integrate experience and its application, who enjoy self-discovery, who like trial-and-error approaches [McCarthy, 1987] N.B. Kolb's names for learners in quadrants one through four were divergers, assimilators, converges, and accommodaters [McCarthy, 1987, and elsewhere].

Instructionally, Type One learners respond best to group discussions, movies, short lectures with discussions, and audio and visual experiences. Type Two learners prefer extensive reading assignments, lectures, audio tapes and "think" sessions. Type Three learners need workbooks, manuals, demonstrations, hands-on activities, and field trips. Type Four learners work well with games, simulation, independent study, problem-solving, contract-activity assignments, and special readings [Ault, 1986, and elsewhere]. There are many other ways of talking about the four quadrants found in the literature [McCarthy, 1987].

McCarthy was intrigued with literature and research on brain hemisphericity and its possible meanings for education. Her work led her to believe that activities in each instructional unit should be targeted towards right-brain orientation as well as left-brain. The writings on 4MAT are filled with information on activities oriented toward each hemisphere [McCarthy, 1987; Leflar and McCarthy, 1983].

In sum McCarthy concluded that the full cycle of a "lesson" would include eight activities. The eight is derived by accommodating each of the four types of learners, using both right- and left dominance in each quadrant. Fairness implies the first conclusion; completeness the second. Her theory is that such lessons highlight the style of each learner for some fraction of the whole. The rotation between left and right-brain activities also gives prime time to the basically different orientations and should lead toward whole-brain performance [McCarthy, 1987].

Research with 4MAT

There have evidently been only four studies conducted on student achievement, comparing 4MAT to traditional methods. There have been additional studies on teachers' attitudes. (In the literature there were two mentions of large-scale longitudinal studies being conducted, but nothing has yet appeared on them. Given the complexity of 4MAT and its great demand for classroom time, when fully used, it would be logical to expect greater validity and usefulness from long-term longitudinal studies than from simple, comparison-group studies.)

Two of the four classroom studies, one of which was a dissertation, were of exceptionally good design. Both controlled carefully for all variables, field-tested lessons and tests before using them in the experiments, and obtained validation of the contents of lessons. Bowers and Wilkerson both taught or had others teach science lessons to elementary school children. Wilkerson reported a significant difference in favor of the 4MAT lesson on an objective test covering the content of an unit, compared to the same unit taught according to the

teacher's manual [Wilkerson, 1988]. On a three-part performance test, using the subject matter, she found no significant differences. She repeated the tests thirty-five days later and found the same results, except the difference on the objective text was even more positive for 4MAT.

Bowers' study was based on a three-hour physics lesson taught to matched groups of academically gifted sixth graders [Bowers, 1987]. In this study 4MAT was compared to a restricted textbook approach. The dependent variables were a 35-item knowledge test (no significant differences), a 25-item critical thinking test (highly significant at .001 level for 4MAT), the whole 60-item test (significant for 4MAT at .05 level), a 6-item attitude rating on the science unit (significant for 4MAT at .05 level), and a 4-item attitude rating on science in general (significant at .05 level for the textbook group).

Two other studies appear in the literature, but both lack the randomness and validation qualities of Bowers and Wilkerson. Mills taught both groups in his study, one that involved college students in a developmental reading class for freshmen at a community college. The groups were not evenly matched, by any criterion, but Mills said they were similar enough for the purpose. His "dependent variables" were responses to the traditional student evaluation of course form, grade point average at end of freshman year, and retention rates for second term. While his "results" favored the traditional method, these results are without any validity [Mills, 1983].

Ault's study is just as badly flawed, and she did not even attempt to measure cognitive results for significant differences. However, she presented evidence that student attitudes were better in the two courses which she taught using 4MAT than in other sections of these courses which she had earlier taught [Ault, 1986]. Her subjects were also college students. Of some interest, however, is one portion of her work: she administered the Kolb Learning Styles Inventory to her students and concluded that the Inventory "fit" these students.

There may be some value in pursuing this with college students in carefully designed studies (though it would take the time and resources to do studies as good as Bowers' and Wilkerson's).

Several additional studies dealt with attitudes. Lieberman, reporting on a big 4MAT staff development project in Boston, developed some data on teacher learning styles, student learning styles, hemisphere dominances, teacher preferences for teaching activities, and (unquantified) teacher opinions/attitudes on 4MAT [Lieberman, 1986]. In general teachers agreed somewhat with statements that parallel 4MAT's philosophy and methods, and they moved closer to them after a year's acquaintance with 4MAT. Further, while negative toward the necessity to spend much time writing 4MAT lesson plans, teachers said that their experiences with 4MAT would be sufficient for them to include more Quadrant One activities in their teaching. (They were now convinced of the importance of Quadrant One activities.) Not surprisingly, they expressed need for help in planning activities for several other quadrants, a need expressed consistently in the literature and remarked upon by McCarthy [McCarthy, 1983, and elsewhere]. More on Lieberman's paper later.

Warren and Dikter reported on a 4MAT project undertaken by three Boston-area high schools which occurred at about the same time as McCarthy's project in Boston (reported by Lieberman). The principals reported that teachers' attitudes changed significantly and in a positive direction on the following professional areas after 4MAT training: planning lessons, observing other teachers, leading discussion, encouraging cooperative learning, and planning curricula. They also changed in attitudes towards testing, perceived professionalism of colleagues and their role in motivating students [Warren and Dikter, 1986]. In general they found that teachers learned 4MAT quickly and were able to use it, with the usual problem of designing right-brain activities.

A much less rigorous paper reports on the experiences of three Ontario principals who brought 4MAT to their schools [Lacey, et al, 1986]. Their teachers reported working with greater facility with 4MAT after training and using 4MAT more systematically in curriculum writing. (These were the goals of their project.) They claim to have gathered some base data on achievement, attitudes and self-concept.

4MAT As a Tool for Instructional Design

According to McCarthy at least seventeen school districts had committed to long-range implementation of 4MAT (McCarthy, 1990). There is no way of gauging how many individuals have made serious use of 4MAT in developing new instructional materials. A few examples from the literature hints at the diversity. One paper describes the use of 4MAT as an instructional design tool for a new "Tech Prep" (Technology Preparation) program in an Indiana school district. According to the authors, 4MAT lends well to Tech Prep's emphasis on integration of content and to the resultant staff development requirements [Blair and Judah, 1990].

Another paper describes a law professor's attempt to reach more of her students by restructuring her courses to include instructional activities representative of all four quadrants. Some might say that this is nothing more than good course planning, but the writer gives credit to McCarthy and 4MAT for the changes [Kelly, 1990]. Still another describes the use of 4MAT in designing a career guidance course. The writer found 4MAT to be especially compatible with the principles of experiential learning which she wished to incorporate (Allyn 1989).

A pair of teachers from New York State described their program of improving students' presentations by using 4MAT. The teachers first developed a "4MAT Wheel" of the eight steps to be used in preparing and delivering a presentation.

The students were given instruction on 4MAT and learning styles in relation to their use of the wheel. Students learned how to put themselves through the eight 4MAT steps as a preliminary to presenting their topics in the same eight steps. Listeners used blank "4MAT Wheels" to assess the presentations. This article included several detailed examples of student topics, reflecting a serious and thorough use of McCarthy's concepts [Weber and Weber, 1990].

In a journal that circulates widely to students in professional education, Wilkerson described a thermatic unit for third grade, "The Changing Land". The unit was of three-weeks duration and used a variety of learning centers [1992]. Wilkerson contrasted the 4MAT approach to a unit of work developed in the separate-subject manner. (In a mere four pages Wilkerson, in addition to describing the 4MAT unit, presented a basic description of the theoretical work undergirding 4MAT.)

Additional complete 4MAT lessons are described in the Arnold article [1987]. No doubt many examples of lessons, units and courses are archived at McCarthy's Excel Corporation.

4MAT As a Tool for Staff Development

Over and beyond the uses of 4MAT as a tool for designing lessons, units and course, McCarthy repeatedly stresses the central role of 4MAT as a tool for altering teacher behavior. In one paper she offers a set of seven suggestions for a staff development program, including work on right brain instruction (1985). In another she describes how 4MAT can be used to re-interpret the roles of principals and students as teachers (1990). In another she describes how 4MAT and an innovation strategy, Concerns-Based Adoption Model, can be combined to develop a comprehensive staff development program (1982).

A more recent article by Kelley described the use of just such a comprehensive program in a Colorado school district. Additionally, Kelley

described how 4MAT training experiences led to curricular change, new styles of student assessment, and staff development work on cooperative learning and TESA techniques [1990].

Others have written about inservice programs on 4MAT, in each case adding support to McCarthy's assertion that 4MAT is a powerful staff development focus. Arnold's paper reflects changes brought about by 4MAT training, based on an extensive training program. Direct attention was given by their trainers (i.e. teachers who had taken McCarthy training) to developing right-and left-mode strategies. In this case teachers expressed pleasure with the training and asked for more workshops on left/right strategies (1987). Lieberman remarked on teachers' satisfaction in being involved in 4MAT workshops, particularly as a relief from their perceived isolation in the classroom. They, too, found that they were taking planning more seriously, and they also found professional satisfaction in executing Quadrant One lessons (1986). Similar views were recorded in the Warren and Dikter paper (1986). Additionally, their paper includes some cautions for teachers. Among the cautions: Quadrant One activities are often noisy, and there is a tendency for some bad behavior to develop during early attempts at using them.

The 4MAT Model as Theory

A. Validity of the Model

There is no direct criticism of the 4MAT model in the literature. To be sure, a number of well-known educators have questioned the relevance of the concept of learning styles to instructional design. Davidman, for example, criticizes the use of self-report data or other formal systems for determining learning styles, preferring to trust teachers' informal assessments for gathering useful information on children's preferences and approaches (1981). Perkins refuses to acknowledge the validity of the concept of learning styles or practice

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of matching learning styles to instruction. He prefers to organize instruction by "process frames" and "product frames" with an emphasis on designing for mastery (1986).

This criticism leads to the question of validity. If research on learning styles is flawed, and even more pointedly, if application of this type of theory to instruction is flawed, does it necessarily follow that 4MAT is mortally flawed? The question is unanswerable, but fortunately, it is also irrelevant. How can this be so?

There is no logical step from a description of "what is" (as illustrated by assessments of learning style, even "valid" assessments) to a prescription for "what ought to be done" (i.e. a prescription of "What to teach and how to teach it"). As Dewey has stated, this step must be an intuitive leap in the dark. In the case of 4MAT, there are two leaps, since 4MAT prescribes a design based on two theories: learning styles and brain hemisphericity. It seems to be common sense to assert that a two-hemisphere brain implies instruction aimed at both halves. It also seems common sense to assert that four basically different learning styles imply four instructional approaches. However, the assertions are just that, assertions. There is no logical path from description to prescription. The justification for proposing 4MAT or choosing 4MAT must be in some domain other than validity of the model. (This, of course, is true of all models of instruction.)

B. Legitimizing the Model

While legitimation is not synonymous with validity, it has some of the force of proven validity. Indeed, even if one were able to prove validity, other forms of legitimation would be necessary for models to have an impact in applied professional fields.

A certain academic legitimation was conferred on 4MAT (and on Dr. McCarthy) by a meeting and its attendant publicity. The so-called "McCarthy Conference," an intensive three-day seminar, brought together a number of people who had done serious work in learning styles and brain hemisphericity. Attendees included

learning styles theorists David Kolb and Anthony Gregorc, a neurosurgeon who worked in split-brain surgery, McCarthy, and four others who were doing specialized work in one of the two areas. McCarthy's long-term interest in learning styles, followed by her post-dissertation study of brain hemisphericity, are fully described in an interview article in which she tells of the conference [Leflar, 1983]. 4MAT was not idly conceptualized.

Another form of legitimation was lent to 4MAT by Educational Leadership, which included five articles on 4MAT in its October, 1990 issue on learning styles. All five were written by proponents of 4MAT, and there were none from critics of 4MAT. However, several rigorous articles on learning styles in that same issue ignored McCarthy and 4MAT.

A third form of legitimation, non-rigorous but significant, is implied by widespread use of 4MAT concepts in school districts across the nation. As stated earlier by 1990 at least nineteen school districts had made significant use of 4MAT in staff development and/or instructional design.

This widespread use supports the conclusion that 4MAT deserves high marks on the criterion of fruitfulness. In the physical sciences great value is attached to the concept of fruitfulness in assessing the worth of a theory, especially in those areas where absolute validity cannot yet be determined (e.g. the nature of light). Fruitfulness implies that a theory has some measure of validity. Further, fruitfulness promises that widespread use of the theory will lead to higher levels of validity.

McCarthy also attempts to achieve legitimation for 4MAT by demonstrating its congruence with other theoretical work. The model itself, as noted, is a synthesis of two quite dissimilar theories. McCarthy's publications reflect vast knowledge of the theoretical work on learning styles and brain hemisphericity [1987, especially]. Additionally, she has tried to show that 4MAT is compatible with Bruner's work on instructional theory and with selected ideas of Maslow's and Dewey and others [1987, especially]. While these attempts can sometimes appear superficial, the effort at showing congruence is a necessary part of

theory-building. An intriguing question is whether McCarthy would make fundamental changes in the 4MAT model if significant theoretical work in related fields was found to be incongruent with present model.

C. Critiquing 4MAT and McCarthy

A review of literature on 4MAT has revealed a ~~pari~~scarcity of research on student achievement. Is the absence of such research a serious matter? Yes and no! 4MAT is not a method but a model, so simple comparison-group studies are clumsy, perhaps invalid. A model, such as Mastery Learning or Whole Language, is best used as a long-term design tool. Indeed, a model gathers full force only when adopted building-wide or system-wide. Achievement research, to be valued for comparisons, must at the least be long-term, allowing the complexity of the model to be implemented fully. While there are allusions in the literature to long-term, longitudinal studies, such studies have not been reported, perhaps not been completed. In the meantime, given the nature of a model, any small-size, short-term studies that yield positive results for 4MAT would seem to represent strong support indeed.

A Deweyan critique would focus on McCarthy's standard practice of dichotomizing. Dewey stated that such dualities were invariably false and misleading. McCarthy spins off dualities like a machine: intellect vs imagination, analysis vs intuition, hearts vs minds, etc! On the one hand she can be criticized for falling into hyperbole, especially when creating dualities, but at other times as well (page 60 in the basic 4MAT Manual, McCarthy, 1987, illustrates both tendencies). On the other hand, this is her technique for theorizing, especially useful for the concept development level of theory building.

A reasonable question to be asked of the 4MAT model is whether it can be used for developing instructional units for discursive as well as non-discursive disciplines, for secondary education as well as elementary education, and for urban as well as suburban schools. The preliminary answer seems to be that 4MAT is capable of such comprehensive use. The professional literature illustrates this comprehensiveness quite well.

And, to close on a personal note, this writer has guided undergraduate students in teacher education in developing rigorous 4MAT "lessons" at both elementary and secondary education levels. One should not, however, underestimate the amount of time and effort required to master 4MAT intellectually and operationally.

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